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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/913,840	02/11/2002	Simon Armour	WO 00/44144	5602
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Townsend & Townsend & Crew Two Embarcadero Center 8th Floor San Francisco, CA 94111-3834				
			EXAMINER	
			GOSHTASBI, JAMSHID	
			ART UNIT	PAPER NUMBER
			2637	

DATE MAILED: 11/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/913,840

Applicant(s)

ARMOUR ET AL.

Examiner

Jamshid Goshtasbi-G.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 11 February 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) 7-9 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3 is/are rejected.
- 7) ☒ Claim(s) 2 and 4-6 is/are objected to.
- 8) ☒ Claim(s) 7-9 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02/11/02 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 03/05/02.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-9 are pending in the application.

Election/Restrictions

2. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-6, drawn to a receiver, classified in class 375, subclass 316.
 - II. Claims 7-9, drawn to an equalizer, classified in class 375, subclass 233.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because other type of equalization circuit can be used. The subcombination has

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separate utility such as an adaptive filter for removing intersymbol interference from a received signal.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art because of their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

3. During a telephone conversation with Pat Boucher on 11/04/04 a provisional election was made with traverse to prosecute the invention of an OFDM receiver, claims 1-6. Affirmation of this election must be made by applicant in replying to this Office action. Claims 7-9 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

4. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship

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must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections – 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takeuchi (US 6408038 B1) in view of Brajal et al. (US 5796814) and Isaksoon et al. (US 6493395 B1).

As to **Claim 1**, Takeuchi discloses an OFDM receiver (col. 6, line 7) comprising a received signal processor (the OFDM demodulating circuit; col. 6, line 42) for demodulating, A-D converting (col. 8, line 11), and down-sampling received signals (col. 7, lines 12-13) to form a time domain digital signal vector; an equalizer having at least a feedback section and having a plurality of tap coefficients, the equalizer acting on the time domain digital signal vector to form a filtered time domain sequence (col. 8, lines 30-34; col. 9, lines 9-12); a Fast Fourier Transform processor for acting on the filtered time domain sequence to form a frequency domain vector (col. 8, line 34 and lines 60-65); an output device

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for converting the frequency domain vector into an output data signal (col. 8, line 66 – col. 9, line 7).

However, Takeuchi is silent about the equalizer having at least a feedback section and having a plurality of tap coefficients; an inverse Fast Fourier Transform processor for acting on the output data signal to form an estimate of the transmitted sequence; and the estimate of the transmitted sequence being supplied as an input to the equalizer to enable decision directed adaptation of the tap coefficients thereof, and further as an input to the feedback section of the equalizer.

In disclosing an OFDM demodulator (Fig. 3, col. 3, lines 37-38), however, Brajal et al. teaches an adaptive equalizer (Fig. 10; col. 7, lines 66-67) having at least a feedback section (Fig. 10) and having a plurality of tap coefficients (Fig. 7; weight factors; col. 8, lines 6-17); an inverse Fast Fourier Transform processor (via Fig. 7) for acting on the output data signal to form an estimate of the transmitted sequence. However, Brajal et al. is silent about the estimate of the transmitted sequence being supplied as an input to the equalizer.

In disclosing a receiver for a multi-carrier communication system (col. 7, col. 52-54), however, Isaksoon et al. teaches a decision-directed equalizer (Fig. 18; col. 17, lines 36-41) having a feedback stage and a feedforward stage where the estimate of the transmitted is fed back to the equalizer to enable decision directed adaptation of the tap coefficients (Fig. 18, equalization parameter updating algorithm) and further as an input to the feedback section of the equalizer (Fig. 18; col. 17, lines 18-53).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Brajal et al. and Isaksoon et al. into the method of Takeuchi for producing the claimed invention because using data taken after the equalizer as one input and with an adaptive updating algorithm, the equalization parameters can be modified in small steps in such directions that the equalizer converges towards a model of the channel inverse.

Claim 3 inherits the limitations of Claim 1. Further, Isaksoon et al. discloses the use of a channel estimator in the receiver (figures 4 and 23; col.7, lines 52-5). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate this feature into the method of Takeuchi (in view of Brajal et al. and Isaksoon et al.) for producing the claimed invention because it provides for channel estimates needed for the decision-directed adaptation of the weight coefficients mentioned in the rejection of Claim 1 above.

Allowable Subject Matter

5. Claims 2 and 4-6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Other prior art cited

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Mueller et al. (US 4247940) discloses a an equalizer wherein tap coefficients are derived in a decision-directed maner.

Wang et al. (US 6693958 B1) teaches a decision directed equalization.

Chow et al. (US 5285474) discloses a method for equalizing a multicarrier signal in a multicarrier communication system.

Liu et al. (US 6775334 B1) discloses an adaptive DFE and decision directed recovery system and method.

Contact information

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jamshid Goshtasbi-G., whose telephone number is (571) 272-3012. The examiner can normally be reached on M-F 8:00/4:30.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel, can be reached on (571) 272-2988. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public

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PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jamshid Goshtasbi-G.
Examiner
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JEAN B. CORRIELUS
PRIMARY EXAMINER
11-10-07